No. 5
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NEW ART OF HARDENING AND PRESERVING WOOD.

ADVERTISEMENT.

WHEREAS His Majesty has been most graciously pleased to grant me His ROYAL LETTERS PATENT, not only for these Kingdoms, but all His Majesty's Colonies and Plantations in *America*, for the sole Practising and Executing my New-Invented Art of *Hardening*, *Toughening*, and *Preserving WOOD* in general, particularly *Naval TIMBER*, from *Rottenness* and speedy *Decay*; and for Preventing Bottoms of Ships from being *Eaten* or *Destroyed* by the *SEA-WORM*;---And whereas the first Part of the said Art is applicable to all Sorts of Wood used in Water-Works, Buildings, Wheel-Carriages, Manufactures, Mechanic Arts, *&c.* liable to Decay thro' the Vicissitudes of Weather, *&c. &c.* I do hereby give Notice, That I am ready to undertake the Preparation of all Sorts of Timber, Wood, *&c.* for the Purposes aforesaid, particularly the Articles mentioned below, at very moderate Charges:---And, in order to render the Invention as extensive as it is beneficial, propose, on certain Considerations, to instruct, and assign over full Power to, any Person or Persons, to practise the said Art, (for their own private Benefit only) during the Term of my Patent aforesaid.

LONDON, *GREAT TOWER-HILL*,
May 30, 1770.

H. JACKSON.

The following is an Abſtract of the LETTERS PATENT.

GEORGE R.

GEORGE III. *by the Grace of* GOD, *of* Great-Britain, France, *and* Ireland, *King, Defender of the Faith,* &c. *To all to whom theſe Preſents ſhall come, Greeting.*

WHEREAS Our truſty and well-beloved *Humphrey Jackſon*, Chemiſt, has humbly repreſented unto Us, That, at a conſiderable Expence, and long Study, he has invented, and brought to Perfection, the Art of *Hardening*, *Toughening*, and *Preſerving WOOD* in general, particularly *NAVAL TIMBER*, from ſpeedy *Rottenneſs* and *Decay*; and for preventing Bottoms of Ships* from being *Eaten* and *Deſtroyed* by the *SEA-WORM*;--And We, being willing to give Encouragement to all Arts and Inventions that may be for the Public Good, have given and granted, and, by theſe Preſents, for *Us*, our *Heirs*, and *Succeſſors*, do give and grant unto the ſaid *Humphrey Jackſon*, his Aſſigns, *&c.* and ſuch Perſons only as they ſhall agree with, Our ſpecial Licence, full Power, ſole Privilege, and Authority to exerciſe the ſaid Arts: And to the End that the ſaid *Humphrey Jackſon* and his Aſſigns may have and enjoy the full Benefit, ſole Uſe and Exerciſe of the ſaid Invention, We do by theſe Preſents, for Us, Our Heirs, and Succeſſors, Require and ſtrictly Command all and every Perſon and Perſons, Bodies Politic and Corporate, and all other Our Subjects, of what State, Name, or Condition ſoever they be, that neither They nor any of Them, either directly or indirectly, do make, uſe, or put in practice, the ſaid Invention, or any Part of the ſame, nor in any ways Counterfeit, Imitate, or Reſemble the ſame, nor make, or cauſe to be made, any Addition thereto, or Subtraction from the ſame, whereby to pretend Himſelf, or Themſelves, the Inventor or Inventors, Deviſor or Deviſors thereof, as they will anſwer their Contempt of This our Royal Command, and be further anſwerable to the ſaid *Humphrey Jackſon*, his Aſſigns, *&c.* according to Law, for his or their Damages thereby occaſioned.

In Witneſs whereof We have cauſed Theſe Our Letters to bemade Patent, &c. Witneſs Our Self, at *Weſtminſter*, the Tenth Day of *December*, 1768, and in the Eighth Year of Our Reign.

* *N. B.* Bottoms of Ships can be preſerved effectually from all the Species of the *Marine Worm*, by an Intermedium of a coarſe Woolen Cloth, Chemically prepared, and applied between the Sheathing Board and Plank: The Cloth adheres firm and faſt to the Bottom in a very hard State, and remains ſo after the Sheathing has been deſtroyed and dropt off; and which no Worm can penetrate, or in the leaſt conſume, without immediate Deſtruction to its Exiſtence. Thick Paper, though equally efficacious againſt the Worm, for want of an interwoven Texture, and under Failure of the Sheathing Board, becomes gradually waſhed away by the Sea, as has been experienced upon the *Scarbro'* Ship of War. All the Tribe of fancied reſinous Preſervatives, made hard by commixing Arſenic, Powdered Glaſs, Mundic, Plaſter of Paris, &c. with the uſual Coatings, and in which Reſpect common Brick Duſt is inferior to none, are equally impenetrable to the Worm, ſo long as they remain intire upon the Bottom; but the leaſt Abraſion opens an Entrance, by which it is too well known the Worm never returns. By a ſimple Variation in the Proceſs upon Cloth, *IRON BOLTS* &c. may be perfectly ſecured from the corroſive Effects of Salt Water, where *COPPER SHEATHING* is uſed.

TO THE PUBLIC.

THE Art of Preſerving WOOD from ſpeedy Decay claims the earlieſt Antiquity, particularly that by external Applications; but, as this Practice is in many Reſpects ineffectual and inconvenient, the Buſineſs has been attempted with Saline Antiſeptics, after the Manner of Animal Curation; but, through Inattention to the general Cauſes of Putreſcence, and the Affinity of Salts with Metalline Bodies, the Conſequences have not hitherto anſwered the Conceptions of Succeſs.

It appears a neceſſary Law of Nature, that all Animal and Vegetable Subſtances ſhould ſooner or later be reduced to their firſt Principles, by Putrefaction: The very Act of Vegetation ſeems to depend upon their Diſſolution; Hence it appears impracticable totally to prevent their Corruptibility; but it certainly is in our Power to check the rapid Progreſs towards it at different Periods, to the perfecting various Arts, and other valuable Purpoſes. A thorough Review of all the common Arts of preſerving Wood and Timber, with the different Failures of Succeſs, induced me to conſider the Subject in a new Light; and, after an unwearied Diligence by Experiments continued upwards of Ten Years, I flatter myſelf to have diſcovered a much more effectual Method of protracting the Durability of all Sorts of Wood than any hitherto known, and that by an eaſy Practice, with cheap,* wholeſome Materials, almoſt univerſally procurable.

The Theory of the Proceſs is barely as follows:----Water is impregnated by Art with a certain Matter, which alters the natural Juices of Wood, contracts its Pores, and becomes ſo fixed therein, as not to be rediſſolved ſimply by Water, Beer, Wine, Spirits, *&c.* This Matter bears great Affinity with that which produces a natural Petrefaction; and petrified Wood, perhaps, was never known to decay. As this Matter will not rediſſolve, of Courſe it can impart no Taſte, or Unwholeſomeneſs, to Liquors. The Wood, however, becomes heavier and harder in Proportion to the Quantity of Matter it imbibes. Every Particle of Wood being thus united to an indiſſoluble Particle of Matter, it ſeems rational to conclude, that it muſt reſiſt incipient Putrefaction more powerfully than what is deſtitute of ſuch Aid and Protection. By a ſlight Variation in the Proceſs, which does not impair its preſervative Properties, Wood is made extremely tough and flexible: And, what appears of ſtill greater Importance, this Matter has not the leaſt *corroſive Effect* upon Metals uſed in Ship-building.

It is the general Practice to boil Naval Timber in ſimple Water, particularly Oak-Plank, to give it a requiſite Pliancy; and lately Sea Water has been introduced

* By Command of the Right Hon. the Lords of Admiralty, the Preparation has been examined by the Royal College of Phyſicians in *London*, and by them adjudged perfectly wholeſome, as appears by their Report to their Lordſhips.—See *London Gazette*, 14th March, 1769.

troduced in the ſame View: Wood is thus diveſted of one of its conſtituent and preſervative Parts, *viz.* its native Mucilage, and conſequently prepared, as it were, for ſpeedy Decay. The ſubſequent Application of reſinous Bodies does not ſufficiently compenſate the Loſs, as they are too groſs to enter deep enough to repleniſh the exhauſted Pores.

The *Dutch*, and from them the *French*, *Danes*, *&c.* for Want of a more ſcientific Method, have been long accuſtomed to impregnate Ship Timber with a Solution of common Salt, in order to preſerve it ſound; and lately, through their Recomendation, the Practice has been adopted here. It is not to be doubted that Wood, kept thoroughly ſaturated with the Brine of Salt, will remain ſound a long Time; as is evident by the Bottoms of Ships employed in the Fiſheries and Salt Trade; but it appears equally certain, where Timber is partially impregnated therewith, that Salt preſently loſes its little Antiſeptic Power, and not only putrifies itſelf, but accelerates the Putreſcence of all Animal and Vegetable Matters. This important Truth has been long ſince demonſtrated to the Royal Society, by an Author of diſtinguiſhed Eminence and Abilities now * living; and later Experience confirms the Fact beyond Diſpute: But, admitting no Objections could be made to its preſervative Power, whoever is acquainted with the conſtituent Parts of Salts and their Affinities with Metals, will readily prognoſticate the dangerous Conſequences which muſt attend its Uſe where the Safety of a Ship depends upon its Metalline Faſtenings: Certainly, Sea-Water needs no additional corroſive Energy. Add to this, that the Health of Seamen ſeems inſecure from the cold, damp State of the Wood, produced by the Deliqueſcence of Salt in moiſt Weather†. The Ends of Ships Beams can be ſecured from Rottenneſs any Length of Time by a more ſalutary and ſimple Application.

It has long been a Deſideratum in the BREWERY to prevent the ſpeedy Decay of the entire Wooden Apparatus, particularly Caſks; the Buſineſs will be effectually performed, if the Wood, whether Oak or Fir, undergoes our Preparation previouſly to the Conſtruction of the Veſſels. *American* Staves, eſpecially thoſe from *Quebec* and *Virginia*, which, in their natural State, are infinitely ſuperior to any of the *German* Sorts, as being leſs porous, harder, heavier, with long and flexible Fibres, can be eaſily diveſted of all that aſtringent Matter which communicates a diſagreeable Taſte to Malt Liquors, *&c.* and at the ſame Time notably improved in Hardneſs, Toughneſs, and Durability;

* Sir JOHN PRINGLE, Phyſician to her preſent Majeſty.—See his Appendix to Obſervations on Diſeaſe of the Armv.

† The Swedes, Danes and French, have long laid aſide the Practice of Salting their Ship Timber, as being found deſtructive to Iron; and the Dutch have altered their Modes of Practice, though evidently built upon no better Foundation than the former; by boring the Timber and filling the Holes with a Compoſition of Common Salt, Alum and Salt petre: Salts cannot operate in a ſolid Form; and when diſſolved, the Addition of Nitre and Alum increaſes the corroſive Power of Salt. DUHAMEL, a very able and experienced Chemiſt, Inſpector General of the French Marine, ſeems to have exhauſted the Subject of preſerving Wood, by a great Variety of intereſting Experiments, particularly as to the Effects of the Sea Water upon Timber, and proves unqueſtionably that Salt diminiſhes the Strength of Oak, deſtroys its Mucilage, and that Oak thoroughly impregnated with Salt Water never dries perfectly, &c*. But it may be neceſſary to remark, that howſoever German Timber may be affected by the Saline Compoſition of the Dutch, it will be found a difficult Taſk to make it thoroughly pervade good Engliſh Oak, by the preſent Mode of Practice.

* See *Du Tranſport des Bois & de L'Exploitation des Bois, premiere Partie.*

bility; and, what eſſentially merits the Attention of the Brewers, Beer kept in Butts thus prepared, 18 or 20 Months, ſuffers no ſenſible Waſte, but becomes racy and rich in ſpirituous Parts; the Avolation of Spirit and elaſtic Air being prevented by the Contraction of the Pores, and their Impregnation with an indiſſoluble Concrete: On the ſame Principle, Caſks ſeem pretty well guarded from contracting, what in the Brewery is termed *Stink*; which is produced by the Putreſcence of the groſs yeaſty Feculencies of Beer in the Pores of the Wood. *Stinking* Caſks are effectually remedied by our Proceſs.

WATER-PIPES of Elm Wood imbibe ſuch an amazing Quantity of the earthy indiſſoluble Principles aforeſaid, as to become incredibly Hard, Heavy, and Tough, inſomuch that they are with great Difficulty ſplit aſunder, and require no wedging in laying down. Hence they reſiſt Putrefaction ſo powerfully, as to promiſe an inconceivable Durability. It is impracticable, at preſent, to enumerate the various Advantages which will reſult to the Public by this Diſcovery; but to form an Idea of future by preſent ſucceſsful Events, the following Experiments ſeem to merit Attention.

DISPATCH being principally to be regarded in Buſineſs, a Copper Veſſel, perhaps the largeſt in Europe, being 56 Foot long, and containing 600 Barrels of Liquor, is erected for this Purpoſe. Sixty-Three Brewers Butts, as finiſhed by the Cooper, are at one Operation, in a few Hours, converted into a ſurpriſing hard, tough, and durable State. The Caſks will be warranted ſweet, free from Warping, and the Hoops from Injury.

Hitherto, Heat has been uſed in the Preparation of Wood; but it is totally unneceſſary, except on account of expediting the Buſineſs: Timber ſufficient to conſtruct 10 or 20 Ships of War, hewn into the neceſſary Scantlings, can be effectually impregnated with the preſervative Principles merely by ſteeping them a few Months in certain cold Fluids. The Quantity of Matter imbibed is aſcertained by the Increaſe of Weight, and may be traced, with the naked Eye, to the Centre of the largeſt Timber. Nothing more is required afterwards, then to dry it in open Air. In like manner any unlimited Number of Brewers Caſks, Pipe Staves, Water Pipes, &c. may in a ſhort Time be compleatly hardened and preſerved; and as the Materials of the Compoſition are cheap and procurable all over *Europe*, and the *Indies*, the Diſcovery promiſes univerſal Advantages, particularly to the *Britiſh* Colonies, in Ship Building, and in Places where Wood, being previouſly prepared as aforeſaid, may be ſtored up in Piles for Exportation without Danger of contracting ſpeedy Decay.

The Theory and Properties of this Art having been duly repreſented to the Right Hon. the LORDS of the ADMIRALTY, and by them recommended to the Conſideration of the HON. NAVY-BOARD, they were pleaſed to order a Fourth-Rate Ship of War, named the *INTREPID*, to be built at *Woolwich*, and prepared under my Inſpection: The Keel, being made of Elm Wood, was adjudged the propereſt Subject for the firſt Attempt. It has now remained upon the Stocks a ſufficient Time to determine its Merit, as it continues perfectly ſound, and almoſt as hard as Oak. All the Parts of the Oak Frame, moſt liable to Decay, being treated in the ſame Manner, became ſo tough and hard, that the Workmen expreſſed their Senſe of the Alteration by a general Complaint of the Edge of their Tools being preſently deſtroyed in hewing the

Timber.

Timber. Oak Plank likewiſe, by a ſlight Variation in the Proceſs, becomes ſo flexible as to bend with great Eaſe upon the moſt difficult Curvatures of a Ship without Cracking; Elm Plank receives the ſame Properties. Likewiſe Timber for Long Boats, &c. boiled in this Compoſition can be eaſily bent and formed out of ſtraight Wood; conſequently ſmall Veſſels become firm and light under ſuch Conſtruction: And how far this may prove advantageous to the Boat and Lighter Builders, is left to their Conſideration.

The Appearance of every deſireable Succeſs in the Frame of the *INTREPID* Ship of War has induced the Hon. Commiſſioners of the Navy to order a Continuance of the ſame Practice upon the *BEDFORD*, a new Ship, of 74 Guns, now building at *Woolwich*.

TREENAILS can be improved in a much ſuperior Degree to their natural State, and will laſt perfectly ſound an unlimited Time.

It is remarkable, that green, as well as ſeaſoned Timber, acquire nearly ſimilar Advantages; that the Matter penetrates to the Centre of the largeſt Timber with Eaſe; and that prepared Wood will not catch Fire, or conſume, ſo readily as other Wood.

The principal Officers of the Hon. BOARD OF ORDNANCE, having experienced a frequent Decay in Artillery Carriages, ordered thoſe of the Garriſon in the Tower to be prepared under my Inſpection, and which, from their Converſion into a very hard State, promiſe great Durability. It is remarkable that prepared Wood is not liable to ſplinter by Shot.

Sweet and clear WATER being ineſtimable in long Voyages, Seamen in general are hereby aſſured, that the nauſeous Matter of Wood, of what Growth ſoever, is readily extracted from Staves, or Caſks, by this Proceſs; and that Water will keep ſweet much longer in prepared Caſks than uſual, and always colourleſs: The HON. COMMISSIONERS OF THE VICTUALLING-OFFICE have thought proper to determine the Merits of the Invention, in this Reſpect, by a Number of Caſks duly prepared for different Purpoſes.

Wooden PUMPS being liable to decay in long Voyages, ſome prepared Pumps are now under Trial, in the Service of the Hon. *EAST-INDIA* Company.

The Proprietors of ſome of the moſt extenſive Water-Works have, at preſent, a great Number of PIPES laid down upon Trial; the Succeſs of which appears ſeemingly anticipated by the following Experiment, viz. Several Pipes, prepared and unprepared, being depoſited together in Earth remarkable for inducing ſpeedy Putrefaction, at *Woolwich*; on Examination, two Years afterwards, the prepared Pipes proved ſound in the Centre, the unprepared rotten and unſerviceable: Both are reſerved for public Inſpection at the Dock-Yard.

Slug-WHEELS of common Town-Carts, with or without Iron-Tire, are prepared whole as finiſhed by the Wheelwright, as well as in Parts, and generally laſt as long again as thoſe in common Uſe; Coach Wheels prepared in the ſame manner wear out their Iron Tire, and are neither ſubject to break, or decay, notwithſtanding the croſs Grain of the Fellies: But, what ſeems of much greater Importance, ſtraight Wood can be rendered ſo flexible, that

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the Circle of a Wheel may be eaſily formed of two Fellies only, under which Conſtruction Coach-Wheels are remarkably improved in Strength, Lightneſs, and Durability.

Prepared Feather-edged DEAL-BOARDS endure the Viciſſitudes of Weather, without any other additional Preſervation, in a very remarkable Manner.

Worms, which devour HOUSE-FURNITURE made of Beech, Elm, *&c.* are unable to perforate the Wood after Preparation.

Several large BREWERS VATS, prepared and unprepared, being filled with Beer; notwithſtanding a previous Seaſoning, the unprepared Vats communicated a nauſeous Taſte of Wood to ſeveral ſucceſſive Guyles of Porter; whilſt Beer kept in the prepared Vats turned out perfectly free from every unnatural Taſte.

Fifty BREWERS BUTTS, made with common *Hamburg* Staves, prepared, filled with Porter, and placed in the worſt damp and wet Cellars which could be ſelected, remained Twenty Months without any viſible Decay, except where ſome Sap had been negligently left upon a few Staves; while new unprepared Butts, under the ſame Circumſtances, ſhewed evident Signs of an approaching Rottenneſs. This Truth hath been ſufficiently confirmed by farther Trials upon ſeveral Thouſand Butts and other Caſks.

A BREWER's BARREL, made of the whiteſt ordinary Fir Wood, being ſuppoſed moſt ſuſceptible of ſpeedy Decay, was prepared and kept Eighteen Months in a mouldy Cellar, and afterwards depoſited in another Four Years, where Water perpetually ſtagnates, and where it ſtill remains in a perfect ſound State; neither is it injured by the Wood-Worm, or other Inſects.

Different Pieces of ELM TIMBER being ſawn aſunder length-ways, one Part of each was prepared, marked, and expoſed, with its Companion unprepared, to the Viciſſitudes of Weather; others, to the alternate Immerſion by high Tides, *&c.* at *Woolwich* Dock; and, in every Trial, the prepared Parts evidently reſiſted Putrefaction moſt powerfully. BEECH Wood, under ſimilar Trial, in Two Years became conſiderably harder.

WOODEN HOOPS, commonly called *Smart Hoops*, receive ſuch additional Toughneſs, as to bend and twiſt in a ſurpriſing Manner, and at the ſame time are firm and durable.

In the Preparation of CANVAS for Ships Sails, the mucilaginous Matter neceſſary for the due Weaving thereof is extracted, and an indiſſoluble Body introduced, which gives Weight and cloſer Texture to the Cloth, and which hence reſiſts Wind more powerfully, and is excellently guarded againſt incipient Putrefaction, called *Mildew*.

WHITE CORDAGE, or the Spun Threads of Hemp, treated in the ſame Manner, may afterwards be impregnated with Tar in the uſual Method, and formed into Cables, Ropes, *&c.* which thus not only prove much more durable, but remarkably ſtronger.

ANIMAL Subſtances may be ſo treated, as in many Reſpects to receive ſimilar Advantages with Vegetables: The Proceſs of TANNING, being at preſent tedious and imperfect, may be greatly ſhortened and improved, either by

a due Combination of the Principles of our Preparation with the Bark and Leather in the uſual Way of Tanning, or by impregnating the Leather therewith after the Tanner has finiſhed his Operations: By the laſt Method, that Species of Leather commonly called *Crop Leather* aſſumes a Hardneſs equal to *Butt* or *Bend Leather*; and this is likewiſe ſo remarkably improved, as to promiſe far ſuperior Durability. The Contraction of its Pores, and Impregnation with indiſſoluble Matter, ſeem to indicate great Utility in Mechanic Arts, where Leather the leaſt pervious to Air and Water has long been a principal *DESIDERATUM*.

GUNPOWDER being packed in Barrels, either for Land or Sea Service, frequently grows damp, by attracting Moiſture from Air through the Pores of the Wood, and conſequently its quick Deflagration and Power are much leſſened. Prepared Caſks having their Pores contracted, and partly filled with a Matter which reſiſts all Moiſture, excellently guards the Powder from this Inconvenience.

The following Articles have been prepared, and yielded undeniable Proofs of ſuperior Durability and other Advantages, *viz.*

Ship-Gun Carriages	Poſt and Railing	Implements in Huſbandry	Maſhing Tuns
Pumps	Fencing	Garden Chairs	Working Tuns
Blocks	Utenſils of Wine-Vaults	Wheel-Barrows	Coolers
Handſpikes	Weather-Boards	Wind-Mills	Rakes
Boat-Oars	Water-Pipes	Wooden-Bridges	Oars
Carriages of Artillery	Waggon, Cart and Coach-Wheels	Store Vats for Brewers, Diſtillers, and Vinegar Makers	Kogs for Wheels
Waggons	Laths for Tiling		Drays
Palliſadoes			Caravans
Ladders			Sledges, &c. &c.

N. B. *It may be proper to remark, that all Sorts of prepared Wood will admit of Pitch, Paint, Tar,* &c. *as in common.*

Country Brewers, and other Conſumers of Caſks, who are ſupplied with Staves, Hoops, or Caſks, ready made, from London, *may have them previouſly prepared as abovementioned.*

*** Orders addreſſed to H. JACKSON, at No. 35. *Great Tower-Hill, London*, will be duly obſerved.